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HALL OF THE ACADEMY OF NATURAL SCIENCES,
PHILADELPHIA, April 9, 1872.

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“	137 to 152	August	1, 1871.
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“	245 to 276	January	16, 1872.
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SAMUEL B. HOWELL, M.D.,
Recording Secretary.

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LIST OF CONTRIBUTORS,

With reference to the several Articles contributed by each.

For Verbal Communications see General Index.

Cope, E. D. Ninth Contribution to the Herpetology of Tropical America ... 200
  On the Fishes of the Ambyiacu River ... 250
Coues, E. Notes on the Natural History of Fort Macon, N. C., and vicinity (No. 1) ... 12
  Same (No. 2) ... 120
Lawrence, Geo. N. Descriptions of New Species of Birds of the Families Troglodytidæ and Tyrannidæ ... 233
Lea, I. Description of three New Species of Exotic Unionidæ ... 188
  Descriptions of twenty New Species of Uniones of the United States 189
Meehan, T. Morphology of Carpellary Scales in Larix ... 106
Meek, F. B. Descriptions of New Species of Invertebrate Fossils from the Carboniferous and Devonian Rocks of Ohio ... 67
  Description of New Species of Fossils from Ohio and other Western States and Territories ... 159
  Notice of a New Brachiopod from the Lead-bearing Rocks at Mine La Motte, Missouri ... 185
  Descriptions of new Western Palæozoic Fossils, mainly from the Cincinnati Group of the Lower Silurian Series of Ohio ... 308
Newton, A. On certain Species of Falconidæ, Tetraonidæ, and Anatidæ 94
Ogden, J. A. Synopsis of the Genus Chettusia (Lobivanellus), with a description of a new species ... 194
Rand, Theo. D. Notes on Feldspars and some other Minerals of Philadelphia and vicinity ... 299
Streets, T. Hale. Descriptions of five New Species of Crustacea from Mexico ... 225
  Catalogue of Crustacea from the Isthmus of Panama, collected by J. A. McNeil ... 238
Thomas, Prof. C. Contribution to Orthopterology ... 194

BIOLOGICAL AND MICROSCOPICAL DEPARTMENT

OF THE

ACADEMY OF NATURAL SCIENCES.

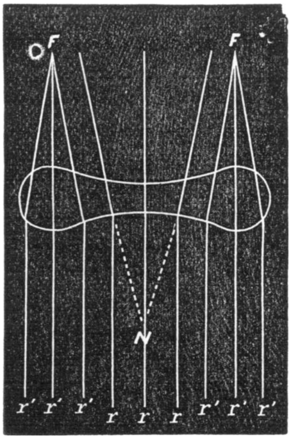
JANUARY 16.

CONVERSATIONAL MEETING.

Prof. J. H. McQUILLEN in the chair.

Twelve members present.

The attention of the Section was asked by Prof. James Tyson, to a simple diagram which he had been in the habit of using in his lectures, for several years past, to impress upon students the circumstances under which the reversal of lights and shadows takes place in red blood-corpuscles while under microscopic examination. The familiar "cracker shape" of the corpuscle being acknowledged, and supposing the entire corpuscle in focus when there is the least shadow, it is plain that the central portion is a double concave lens, while the periphery will act as a double convex lens. The centre of the corpuscle will therefore cause the parallel rays *r r r* to disperse and pass beyond the corpuscle,



diverging as though coming from the negative focus *N*, which is the point to be focussed by the object-glass to make the centre bright. But to do this, the object-glass must approximate the corpuscle, hence it becomes within the focus for the entire corpuscle. But when this is the case the periphery of the corpuscle is dark, because acting as a double convex lens it causes the parallel rays $r' \, r' \, r'$ coming from the mirror to converge and to come to a focus at the point *P*, above the corpuscle. Now, to make the periphery appear bright, the point *P* must be focussed. But to focus this, the object-glass must be removed from the corpuscle, since the rays must again diverge before they can again be made to form an image, and in so doing the object-glass is placed "beyond the focus." When this is the case, however, the centre is no longer in focus, and, therefore, appears dark while the periphery is bright. In the opposite position, or when the objective is within the focus, the centre is bright and the periphery dark. The diagram can easily be carried in the mind's eye, and at once the facts can be thought out without troubling with their recollection the memory, which is here particularly apt to be treacherous. Indeed, the speaker said that he could never recollect the circumstances under which the centre was bright and the periphery dark, and *vice versa*, until he had called to his aid this diagram. And that the exact circumstances are liable, at least, to escape attention, is seen in the fact that in a work of no less acknowledged value than the seventh edition of "Carpenter's Human Physiology" (1869) is contained a misstatement of the facts. We find, on page 200, the object-glass described as being *rather beyond* the focus of the microscope when the periphery is dark and the centre bright, and *within the focus* in the opposite appearance—that is, when the centre is dark and the periphery bright. They should be reversed. In the last edition (1868) of Carpenter on the Microscope, however (pages 166, 167), we find the principle applied and the fact correctly stated, though a few lines further we find it stated that the hexagonal areola in diatoms appear dark when the surface is slightly beyond the focus, when they are described as hexagonal *elevations;* if the latter be the case, then *they should appear dark when within the focus*, as is the case with the periphery of the corpuscle. So, too, on page 710 of the latter volume there is reproduced the same drawing referred to in the text-book on physiology, but with the description reversed, and therefore correct. The corpuscle is, however, described as in focus when the periphery is in focus. Of the other text-books now within our reach, Dalton has it correctly on page 214 of his third edition; Flint, Kirke, Ranke in his "Grundzüge der Physiologie," and Stricker in his "Handbuch der Lehre von den Geweben," refer to the reversal of light and shadow, but do not state the circumstances under which it takes place. Marshall makes no allusion to it.

Dr. McQuillen exhibited five microscopical specimens prepared by Dr. George D. Harriman, of Boston, consisting of dentine, cementum, and bone, which had been acted upon by dilute muriatic acid removing the earthy salts and leaving the cartilaginous basis of which those structures are composed, the latter of which had then been stained with carmine. These specimens had been prepared with a view of demonstrating that dentine does not consist of tubular and intertubular structures; also that in cementum and bone the lacunæ and canaliculi are not empty spaces, but occupied by a soft solid body or substance.

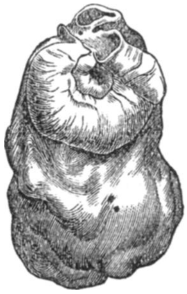
FEBRUARY 6.

Director S. W. MITCHELL in the chair.

Sixteen members present.

Mr. William H. Walmsley exhibited slides showing the difference between the torn edge of our ordinary paper and that of the thick, strong paper used by the Chinese for the manufacture of clothing. Both appeared to be composed of cotton, but the foreign article bore the aspect of being made directly from the cotton fibres, instead of from comminuted woven fabrics.

Fig. 1.



Dr. McQuillen directed attention to a remarkable specimen of hypertrophy of the roots of a left superior molar measuring $2\frac{1}{2}$ inches in length by $2\frac{5}{8}$ inches in circumference, and weighing $12\frac{1}{2}$ dwts. (Fig. 1), which he had exhibited at a previous meeting and of which he had promised to make a microscopical examination. This he had done, and now submitted the results under the microscope in three sections taken from the same locality, one being under the other.

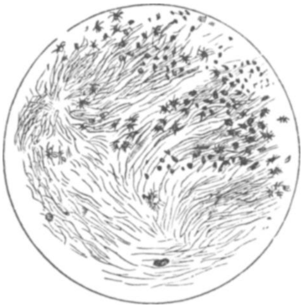
As he had anticipated, the growth proved to be hypertrophy of the cementum, one of the three hard structures entering into the formation of the human tooth, viz., enamel, cementum, and dentine. The term exostosis, frequently applied to this growth, was open to exception on account of the fact that there are certain characteristic differences between cementum and bone, which any one at all familiar with the microscopical anatomy of these two structures will readily recognize.

With a view of making these differences apparent to those unacquainted with the subject, he had placed under one of the microscopes a section of bone. This specimen shows a transverse section of the Haversian canals with the lacunæ and canaliculi arranged around them in concentric laminæ. In the cementum, on the contrary, canals for the passage of blood-vessels are rarely seen, while the lacunæ and canaliculi are quite numerous.

The three sections from the hypertrophied structure differ from each other in a somewhat remarkable manner, when taking into consideration the fact that they had been in such close contiguity.

In the first or outer section the lacunæ and canaliculi are presented in the usual arrangement of cementum. In the second section, taken immediately under it, there are, in addition to the lacunæ and canaliculi, a number of irregular spaces; while in the third section (Fig. 2) the lacunæ are largely increased, and the canaliculi are more numerous and increased in length, running

Fig. 2.



in a spiral direction analogous to dentinal tubuli in secondary dentine.

Dr. F. W. Lewis inquired what difference there was between these exostoses and epulis.

Dr. James Tyson remarked that, microscopically, true epulis is a fibrous tissue, and springs from the mucous membrane, although the giant-celled myeloid tumor (giant-celled sarcoma of Virchow) generally springs from bone, and is sometimes incorrectly called epulis. With regard to the nature of cementum, Dr. T. suggested that it seemed more philosophical to place it in the same category with bone, since it only differed from true osseous tissue in the absence of Haversian canals for minute bloodvessels, which were unnecessary on account of the close contiguity of the structure (cementum) to its vascular supply.

Dr. Tyson also showed an ingenious *gastric canula*, improved by himself by the addition of a cover and catch for preventing the loss of gastric juice, an accident which is constantly occurring with the ordinary canula in consequence of the animal's scratching out the cork after the instrument is adjusted in the fistula from the stomach.

FEBRUARY 20.

CONVERSATIONAL MEETING.

Seven members present.

MARCH 6.

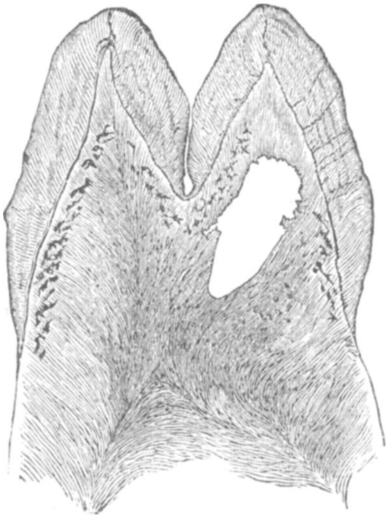
Director S. W. MITCHELL, M.D., in the chair.

Eight members present.

The Corresponding Secretary presented photographs of the test Diatoms *Surirella gemma* and *Amphipleura pellucida* (the latter exhibiting 91,000 striæ to the inch) from Col. J. J. Woodward, of the Army Medical Museum at Washington, and moved a vote of thanks for the same, which was carried unanimously.

Dr. J. H. McQuillen exhibited half a dozen microscopical slides, handed to him by Dr. R. W. Varney, of New York, viz.: Transverse section of the maxilla of a cat, with the incisors, canines, and molar teeth in position; nodules of secondary dentine; section of hypertrophied root of a molar tooth; hemipterous insect (*Tingis arcuata*); longitudinal section of a deciduous incisor and of a molar tooth. Dr. McQuillen directed particular attention to the last-named specimen as having a practical significance bearing upon the diseases and treatment of the teeth. Under the microscope a fissure (Fig. 3) inappreciable to the naked eye could be seen passing through the enamel and enlarging into an oval cavity near the junction with the dentine, also a number of interglobular spaces in the dentine in close proximity to the fissure in the enamel. This fissure and the interglobular spaces, being due to defective formation, are therefore predisposing causes of decay. While such a fissure would be inappreciable to the naked eye, a delicate probe would readily pass into it, and a tooth found in such a condition should be filled immediately, so as to prevent the development of caries; for so long as acids, decomposed food, and other exciting causes are prevented from coming into contact with the defective dentine, the predisposing cause remains dormant. This specimen closely demonstrates the importance of promptly filling the small cavities formed in the depressions on the grinding, buccal, and lingual surfaces of the bicuspids and molars, and on the palatine surface of the incisors and canines.

Fig. 3.



APRIL 3.

Director S. W. MITCHELL, M.D., in the chair.

Eight members present.

A donation from the Surgeon-General's office of Dr. J. J. Woodward's interesting report, entitled "A Memorandum of the Test Podura, with Five Photo-micrographs," was received.

Dr. James Tyson exhibited slides of the deposit from two specimens of urine from a so-called *intermittent hæmaturia*, which were interesting, if not important, from the fact that the first specimen, though containing granular casts, did not contain blood-corpuscles, and that the second, between which and the first the urine had become quite clear, contained, in addition to granular casts, blood-corpuscles and blood-casts. The importance of this observation lies in the circumstance that in the cases of intermittent hæmaturia reported by Harley (*Medico-Chirurgical Transactions*, vol. 48, 1865), blood-corpuscles were exceedingly rare, being found in but a single case, and not more than one or two in the field of the microscope. So rarely, indeed, have corpuscles been present, that Dr. Beale, in the first volume of the *Practitioner*, August, 1868, says that "it is therefore improbable that in these cases there is any hemorrhage as in acute inflammation of the kidneys, and they ought not to be spoken of as cases of hæmaturia."

In the present case all the other phenomena of intermittent hæmaturia attend, and in the second specimen of urine there are many free blood-corpuscles and blood-casts, while in the first the most careful searching detected none.

The treatment found most useful in intermittent hæmaturia, that by antiperiodic doses of quinia, preceded by a purgative dose of calomel, has been the most satisfactory, there being no recurrence since its adoption, although three weeks have elapsed, while other modes of treatment adopted since October, 1870, when the affection first appeared, have signally failed.[1]

Dr. Joseph G. Richardson exhibited a slide charged with *pulmonary elastic tissue* from the boiled sputa of a phthisical patient in the Episcopal Hospital, and called the attention of the

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[1] July 1st, 1871. The patient has since quite recovered under this treatment.

Section to some characteristics of the elastic fibres, to wit, first, the Delta (Δ) rather than simple *Y* shape frequent among the fragments, which he attributed to the greater resistance at the meeting-point of the walls of three air-vesicles to any disintegrating process; and second, the transverse fracture of its component elastic filaments, resembling that of an India-rubber thread, instead of displaying a frayed-out appearance similar to that presented at the extremity of a broken cotton or linen string.

By these peculiarities pulmonary elastic tissue can generally be distinguished from folds in the walls of boiled-starch corpuscles; from mycelial threads of fungi (which, when dichotomous, often have stem and branches of nearly the same size); and from vegetable fibres, which seldom break transversely, and which, when split, generally assume the *Y* and not the *Delta* shape. (*Vide paper on the Detection of Lung Tissue in Sputum, in the New York State Medical Society's Transactions for* 1871.)

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CONTENTS.

Thos. Meehan. On the office of Bud-scales and Involucral Bracts 245
Jos. Leidy, M.D. Remarks on the Minerals of Mount Mica . 245
Jos. Leidy, M.D. Remarks on Fossils from Oregon . . . 247
Edw. D. Cope. On the Fishes of the Ambyiacu River . . 250
Edw. D. Cope. On a Species of Galeodes 295
Thos. Meehan. On the Seeds of Hamamelis Virginica . . 295
Thos. Meehan. On the Angular Divergence of the Branches of Plants 295
Jos. Leidy, M.D. Flies as a means of Communicating Contagious Diseases 297
Edw. D. Cope. On the Fauna of the Wyandotte Cave . . 297
Edw. D. Cope. On some Fossil Reptiles from Western Kansas 297
Theo. D. Rand. Notes on Feldspars and some other Minerals of Philadelphia and vicinity 299
Edw. D. Cope. On Phrynosoma Ornatissima, Grd. . . . 305
Jos. Leidy, M.D. Notice of some Worms 305
F. B. Meek. Descriptions of New Western Palæozoic Fossils mainly from the Cincinnati Group of the lower Silurian Series of Ohio 308
Report of Librarian 337
Report of the Curators. 338
Report of the Botanical Committee 340
Report of the Recording Secretary 341
Report of Recorder of Microscopical and Biological Section . 341
Reports of the Conchological Section 343
Officers for 1872 346
Elections during 1871 347
Correspondence during 1871. 348
Donations to the Library 351
Proceedings of the Biological and Microscopical Department.

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